WIND LOADING

D J REYNOLDS, G3ZPF*

An overview of the forces presented to antennas and masts, plus hints on foundations, mast location and insurance

(PART 1)

CHOOSING AN ANTENNA, and a mast to carry it, can be a confusing business. This stems from the fact that the loads presented to the set-up by wind forces vary across the country in general, and within a locality depending on the surrounding topography. Advertisements for towers relate the strength of the various models to the headload they can carry at a particular design speed, but unfortunately they do not always refer to the same wind speed, which makes direct comparison difficult. Antennas themselves (which present the headload to a mast) can be seen quoted either as an effective wind area, or as a headload at one given wind speed. Often this is a different wind speed to those quoted for the towers. In the case of trap verticals very little information is ever given, but occasionally a "maximum survival velocity" is given, or a statement to the effect that guys will not be needed under normal circumstances, whatever those might be.

It would obviously be useful to determine what wind speed is appropriate to any given QTH, but remember that the derivation of wind speeds is only the first step in the design of towers. Due to their physical proportions they are especially sensitive to wind excited oscillations which magnify normal working stresses, and to ice formation which surcharges deadloads and increases wind areas.

WHAT FOLLOWS IS NOT INTENDED TO BE A DESIGN GUIDE BUT GENERAL GUIDANCE PRIOR TO SEEKING THE DETAILED ADVICE OF THE MANUFACTURER.

All tower advertisements appear to quote CP3 Chap 5 part 2 as the basis for their wind loads, both for lattice masts and tubular/square "solid" masts. In actual fact, for the specific case of unguyed lattice masts, BS8100 should now be used. This is a more recently introduced publication, and although it adopts a somewhat different approach to determination of wind speeds than CP3 Chap 5, both methods of determining wind speed agree to within 10 per cent. With that in mind, and as I am more familiar with CP3 Chap 5, I shall use that as a basis to enable readers to obtain estimates of the wind speed appropriate to their particular QTH. Incidentally, the various tower manufacturers do use the latest code of practice but are unwilling to change the reference to CP3 Chap 5 in their advertisements in case it causes confusion, especially since the values of wind speed from either code are compatible.

Design wind speeds

The British Standards Institution publishes a code of practice for determination of wind loads, referred to as CP3 Chap 5 part 2. In addition to determination of design wind speeds, it also gives guidance on the conversion of wind speed into wind force for all manner of structures, although only a small part of the latter sections are relevant here. To determine the design wind speed for a given QTH, three items of information need to be determined:

(1) Basic wind speed (V).
(2) Topography factor (S1).
(3) Ground roughness and height above ground factor (S2).
(4) Years of exposure factor (S3).
(5) Wind direction factor (S4).

Basic wind speed is determined from the map of the UK given in the code, and reproduced in Fig 1. It represents the 3s gust speed estimated to be exceeded on average once in 50 years. Values are those at 10m above ground in an open situation.

Topography factor will have a value in the range $1{\cdot}0 < S1 < 1{\cdot}36$ and is to allow for the variation in wind speed around hills, cliffs and valleys. CP3 Chap V classifies topography into three basic groups, depending on the upwind slope, and gives detailed formulas for precise calculation of S1 for sites at various points around significant topographical features. For modest amateur set-ups it will be simpler to take the maximum figure of 1·36 for all locations in the vicinity of major changes in landscape. A value of unity is appropriate to level ground, but if in doubt use 1·36.

Ground roughness and height above ground factor takes account of the combined effect of ground roughness, the variation of wind speed with height above ground, and the size of the building under consideration. Values are tabulated in CP3 Chap V for a variety of locations from

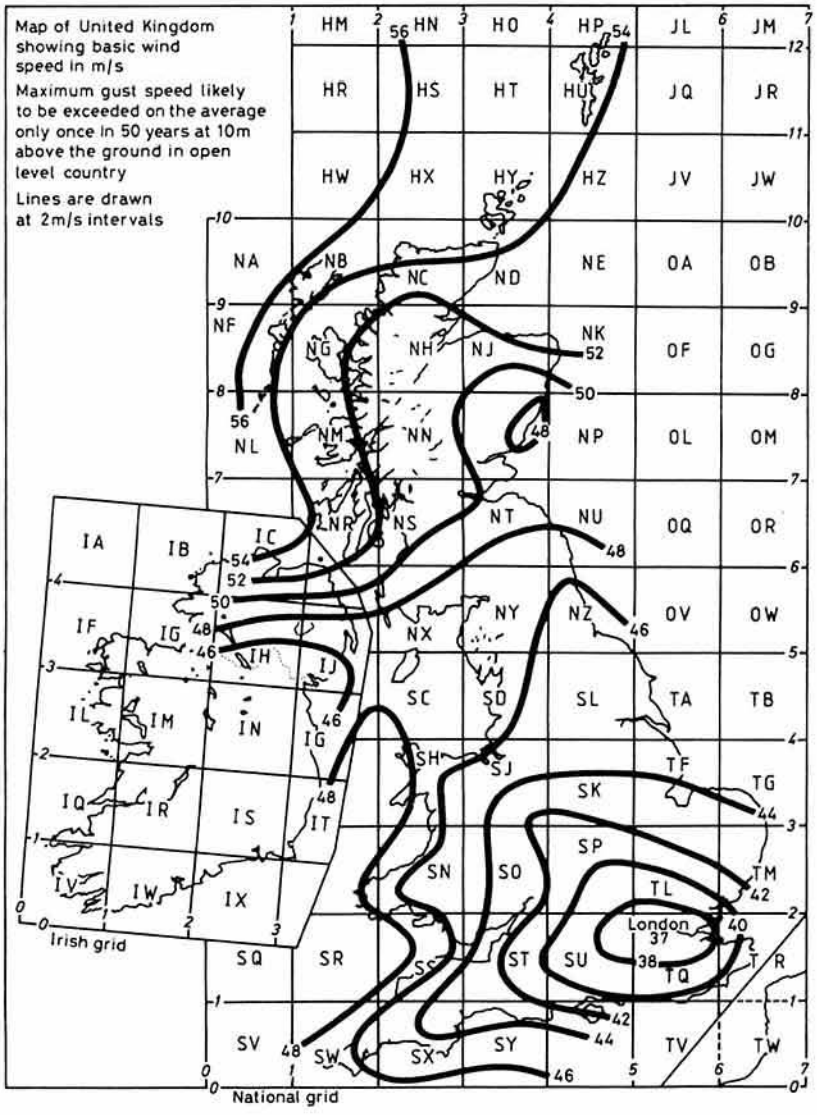
Map of United Kingdom showing basic wind speed in m/s
Maximum gust speed likely to be exceeded on the average only once in 50 years at 10m above the ground in open level country
Lines are drawn at 2m/s intervals
Irish grid
National grid
London

Fig 1. Basic wind speed map for the UK reproduced from CP3 Chap 5 Part 2

*502 Lapwood Avenue, Kingswinford, West Midlands, DY6 8SG

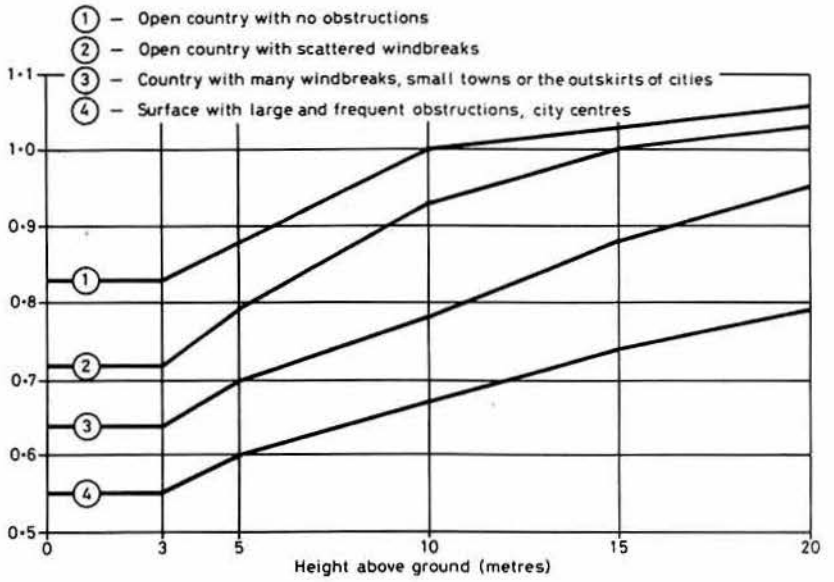

Fig 2. Calculation of S2. The graph is derived from charts within the code of practice. Use the curve appropriate to the local terrain

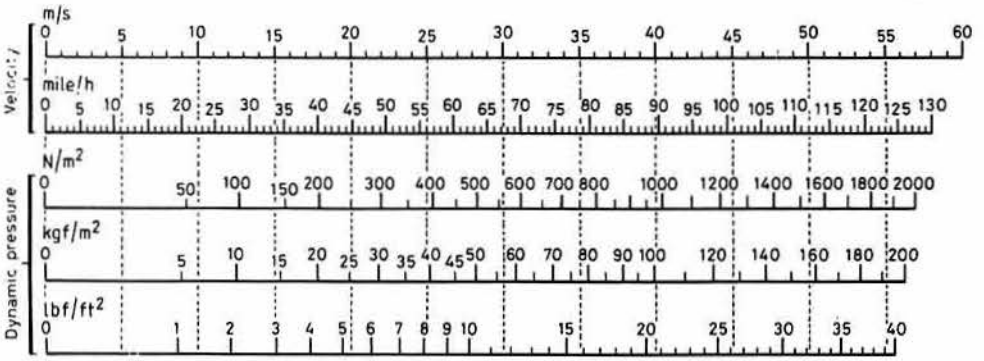

Fig 3. Conversion chart for wind speed and dynamic pressure. Imperial units are included for the benefit of those readers not yet familiar with the metric system

exposed moorland to city centres, and for varying heights and building sizes. For amateur applications up to 20m the factor varies from 0·64 to 1·06, and a graph derived from that table is shown in Fig 2.

Years of exposure factor is generally taken as unity.

Wind direction factor. The basic wind speed may be adjusted to ensure that the risk of it being exceeded is the same for all directions. A table is given in CP3 Chap V for all wind directions, but in almost all circumstances this will inevitably be unity and is best assumed as such.

All of this leads directly to the design wind speed Vs being derived from:

$$Vs = V \times S1 \times S2 \text{ (since S3 and S4 are both unity)}$$

This will give readers an idea of the wind speed that towers and antennas should be capable of withstanding at their particular location, and the simplifications used should ensure that the value errs on the side of safety. Using this figure as a guide, it is possible to assess the suitability of beams or verticals, if a survival velocity is quoted. In addition, most advertisements quote tower headloads at a given wind speed, so it is possible to gain a "ballpark" estimate of the model of tower required, bearing in mind that the allowable headload will reduce as the wind speed on a given tower is increased.

Having never been in a position to erect a tower, I wrote to the main tower manufacturers and asked what information they gave out as standard to potential radio amateur customers, and what information they would require from customers so that a precise headload for each location could be given. The difference in replies was somewhat surprising, with one manufacturer forbidding me to mention its products in any context. Generally speaking, the norm seems to be to provide a typical headload at one wind speed only, and rely on the customer making more detailed enquiries. At the other end of the scale, SMC sent literature with typical headloads quoted for several wind speeds. In addition to headloads for masts, SMC informed me that they keep the wind loads for most antennas on file and can interpolate the loadings to those of any wind speed.

All the major tower manufacturers, regadless of their replies to my letter, earn their keep predominantly from commercial installations. At amateur radio prices there is no way they can do individual site surveys, but they will obviously try to be as helpful as possible. I can only suggest that readers take the typical headload values quoted in trade literature as just that, and get precise advice from the manufacturers for their particular QTH. In the end though, it all comes down to following their advice to the letter, not just "sort of". It might save in the long run to have a headload capacity in excess of immediate needs to allow for future antennas to be erected, or a larger version of the current one once the neighbours have got use to it.

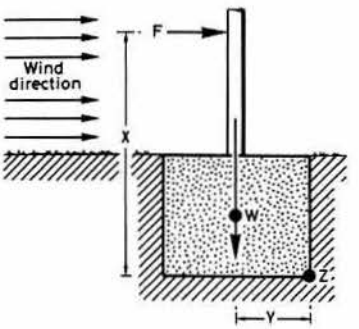

Fig 4. Simplified diagram showing the overturning and restoring forces present at the base of a self-supporting tower

Calculating wind pressure

Having derived the wind speed appropriate to a location, it is possible to relate that directly to the pressure exerted by the wind (Fig 3). Using this chart, it is possible to estimate the wind load of an antenna at any wind speed from a value given for one specific wind speed. This will not, unfortunately, be suitable for interpolating the headloads at any wind speed for a tower because of the complications introduced by the wind load on the profile of the tower itself.

Consider the hypothetical case of an amateur living in the highlands of Scotland who is contemplating a new vhf array. Trade leaflets state that the array has a wind load of 22·5lb at 80mph and a maximum survival velocity of 160mph. What will be the wind load at his QTH, and will the survival velocity be exceeded?

The first step is to determine the basic wind speed for the map, and a figure of, say 52m/s seems appropriate. In rugged terrain the value of S1 should be taken as 1·36. For a suitably bleak moor and a mast height of 10m S2 can be taken as 1·00, giving a design wind speed of 52 x 1·36 x 1 = 70·72m/s. Converting this to Imperial, for those who cannot relate to metric, can be done by reference to Fig 3; although, since it is off the top end of the scale, look up half the value (35·36m/s) giving 78mph and then double that, giving 156mph. So it seems that the antenna should not fall apart in the wind, but what of the load it presents to the tower at this speed?

Looking again at Fig 3, it can be seen that 80mph coincides with a pressure of 16·5lb/ft^2, and since the proposed antenna has a wind load of 22·5lb at that speed, it must have an effective wind area of 22·5/16·5 = 1·36ft^2. A speed of 156mph coincides with a dynamic pressure of about 33·5lb/ft^2. Multiplying this by the wind area of the array gives an expected headload of 33·5 x 1·36 = 45·56lb. Provided the intended mast can cope with this head load, all should be well and it is worthwhile seeking more detailed advice from the makers.

Although in this example a doubling of the windspeed produced a doubling of the headload this is not always the case. Looking at Fig 3, it can be seen that some scales are non-linear, so at lower speeds a 50 per cent increase in wind speed can more than double the headload of a given array.

Maximum survival velocities should be interpreted with some care, depending on the material used. Aluminium is very susceptible to fatigue in conditions of cyclic loading and, basically, the longer it is required to function then the less strength it can be assumed to have. Most antennas are made from aluminium, and their long term survivability will depend on what service life was assumed for its design. This will also apply to self-supporting masts fabricated in aluminium, and explains why major tower suppliers use steel.

Foundations

However strong a tower is, it will not stay vertical for very long unless some care is given to the construction of a suitable foundation. Generally speaking, this consists of nothing more than a hole filled with concrete into which a suitable mounting post is cast, but there are some pitfalls to be avoided. Base sizes will depend on the bearing capacity of the soil at each QTH. In commercial circles a trial hole would be dug to determine the soil characteristics at the bottom of the base. However light the loadings, the bottom of all bases should be at least 900mm below the general ground level to ensure that it is below the ground movements caused by the annual freeze/thaw cycle. The fact that ground can be affected to such a depth may come as a surprise to some, but house foundations go down to a similar depth for exactly the same reason.

As well as providing a stable footing for the tower, in the case of unguyed towers the foundation also prevents the tower falling over. Fig 4 shows how this happens. With the wind blowing in the direction shown, the tower and base will attempt to overturn by rotating about "z". The force "F" is the result of wind pressure on the tower and antenna array, and so . . .

$$\text{Overturning moment} = F \times X$$

Acting against this will be the combined weight of the antennas, tower and base.

$$\text{Restoring moment} = W \times Y$$

Where W is the total weight of the system. The restoring moment should be at least twice the overturning moment to give a factor of safety.

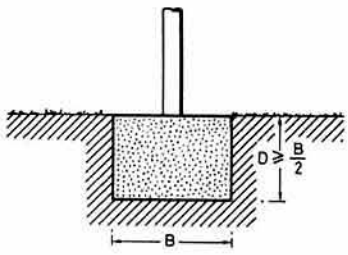

Fig 5. Unless reinforcement is used in a concrete base, the ratio of height:width should be 1:2 or greater

Obviously since "Y" is half the size of the base, increasing the size of the base will increase the restoring moment because both "W" and "Y" will be greater. To ensure that an unreinforced concrete base will not crack under load, the depth should always be more than half the width (Fig 5). Given a normal depth of 900m m, the maximum size of an unreinforced base will be 1,800mm square.

It is extremely unlikely that most amateurs will need anything like this, but if a larger base were needed, either the depth would need increasing to maintain the same proportions, or the base would need steel reinforcement. Reinforced bases are beyond the scope of this article, because anyone erecting a tower sufficiently "man-sized" to require one would obviously be using professionals in any case.

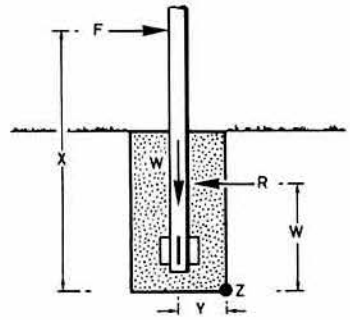

Fig 6. With deep narrow bases, the passive resistance of the soil has to be relied upon to prevent overturning. With X so large and Y so small, F × X is greater than W × Y. The soil resistance (R × W) is used to prevent overturning. This method is not tolerant of "corner-cutting". See text for comments

While on the topic of base proportions, I would like to mention a couple of base types which I have seen described in the amateur press over the years. The first type (Fig 6) almost certainly relies on sidewall pressures to assist the restoring moment. Although this can be made to work in certain soil types by professionals, it is not at all tolerant of corner-cutting. There are (to my mind) two problems with the diy brigade relying on sidewall pressures from the soil. First, the soil around the base will almost certainly have been disturbed by the hole digging operation. Unless the soil is properly compacted, sidewall pressures cannot fully develop. Secondly, to develop passive sidewall pressures the base has to "rock" ever so slightly to bear on the soil. Wind loads are cyclic in nature, so the base will move imperceptibly back and forth. If the soil is not properly compacted to begin with, this can open up a small gap around the base into which rainwater will gleefully percolate. This softens the soil, so the base would have to move just that tiny bit further to develop sidewall pressures as high as before. That would open up the gap around the base just a little more, allowing more rain to enter (Fig 7). The eventual effects of this process should be obvious.

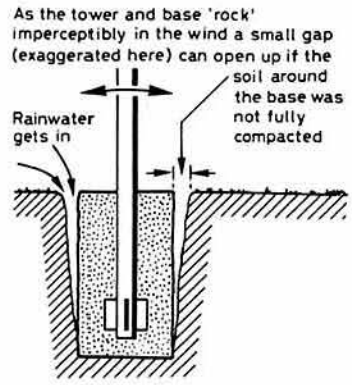
As the tower and base 'rock' imperceptibly in the wind a small gap (exaggerated here) can open up if the soil around the base was not fully compacted
Rainwater gets in

Fig 7. If the ground around the base in Fig 6 is disturbed, then the movement under wind loading may open up a small crack around the base. See text

The second type of base I have seen described is what I can only refer to as a "backfill" base (Fig 8). After the hole is dug and the ground post positioned, the earth is replaced gradually, compacting it in layers. Then a concrete "polo-mint" is cast on the surface to prevent the ingress of rainwater. Again, success hinges on correct compaction of the fill material, and in my opinion amateurs would probably do better to use concrete to refill the hole. One magazine published a "refinement" of this

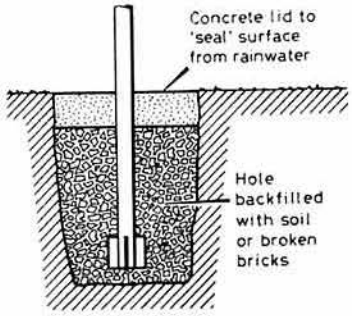

Fig 8. Although this type of base could be made to work in certain soil types, it does require the compaction of the backfill to be expertly done. Personally I would consider the mass concrete base to be more tolerant of corner cutting

type of base, where the hole was refilled with broken bricks. This unfortunately introduces two further problems. Apart from the fact that compacting broken bricks properly is even harder work than compacting soil, certain types of brick will deterorate rapidly if used below ground. In addition, the crushed bricks, being pourous, will attract groundwater. They will almost certainly have damaged the galvanising on the groundpost as they were rammed down, so the groundpost will rust away prematurely.

The construction of a concrete base is not without pitfalls either. First, the hole must be dug, but then it is useful to cast about 75mm of concrete at the bottom of the hole to provide a stable working surface. Corrosion of any metalwork imbedded in concrete is dependant upon the amount of "cover" of concrete. Providing that at least 50mm of cover is available, the strongly alkaline nature of the concrete will prevent corrosion of the ground post. It pays to allow for about double that, to allow for things moving around as the concrete is placed in the hole. Fig 9 shows the set-up prior to placing the concrete. Remember that concrete is very heavy and that the post will need to be secured to avoid any movement. The amount of concrete needed will probably be beyond the realms of mixing it by shovel, a bag at a time. There are two possible alternatives. Either hire a small cement mixer, of the type often used by small builders and landscape gardeners, or purchase ready-mixed concrete. The latter, while more expensive, will provide a more consistent mix. A phone call to the local supplier might pay dividends even for small amounts. I know of at least one amateur who had a surplus part-load off an adjacent road construction site for free, after workmen saw him digging a hole for his tower.

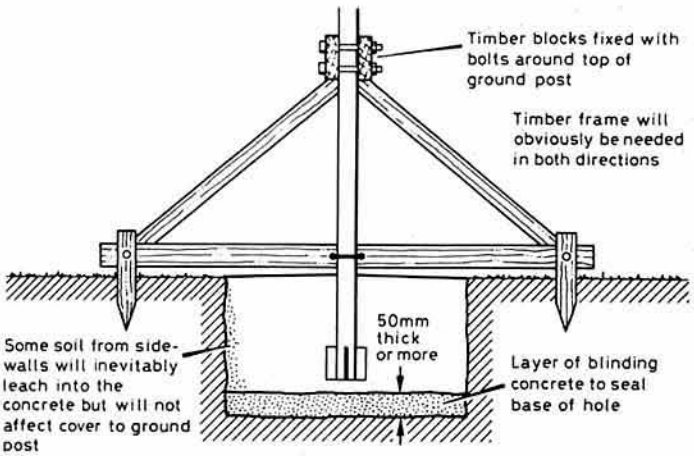
Timber blocks fixed with bolts around top of ground post
Timber frame will obviously be needed in both directions
Some soil from side-walls will inevitably leach into the concrete but will not affect cover to ground post
50mm thick or more
Layer of blinding concrete to seal base of hole

Fig 9. Wet concrete is extremely heavy and it is essential that the ground post is securely held in position. The layer of blinding concrete across the base of the hold prevents loose soil being drawn up into the base, thus reducing the protection against corrosion of the ground post. Some soil will inevitably work loose from the sidewalls too, but this will not be a problem provided the quantities are small

Before arranging for concrete to be delivered, pay some attention to the method of transporting it from the truck to the hole. As far as I know, drivers allow a 15min unloading time, but it would be best to check this when ordering. Concrete will undergo an initial "set" after a few minutes, and should be in its final compacted position before this occurs. Thereafter it will attain roughly two-thirds of its final strength after seven days, and full strength after 28 days. Obviously it is not a good idea to put up the tower before the concrete has hardened, but at least it gives ample time to recover from all the physical effort.

David Reynolds was born in Dudley in 1951. Classmates introduced him to electronics in his early teens, and the unbiquitious HAC one valve receiver kit introduced him to the short waves. He obtained his ticket in September 1970, and coincidentally the first contact turned out to be with the father of one of his old classmates although this was not realised until some time later. After a year on 1·8MHz getting his feet wet, attention was turned to hf. Initially ssb was used exclusively, but a bad case of laryngitis prompted a few days on the key, and nowadays cw is the main interest. Although having successfully designed and built electronic keyers from ttl logic in the early 'seventies, he has now reverted to a straight key again. Last year a five-band DXCC plaque, which was accomplished using only dipole antennas, appeared on the shack wall. Inbetween ragchews, the WITU award is now the background interest, along with a partly-completed sci-fi novel.

The concrete will only provide protection against the ingress of water, and consequently against corrosion of the ground post, if it is properly compacted. This cannot be done by stamping around in wellies, and the best way is to hire a concrete vibrator. This consists of a sealed tube which vibrates mechanically when fed with compressed air, and being physically undemanding is the ideal job for the xyl if she feels enthusiastic! Using a concrete vibrator will save a tremendous amount of time and effort and ensure that the concrete is free from voids.

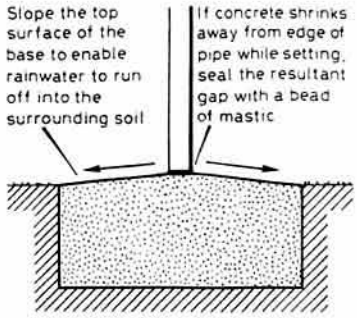
Slope the top surface of the base to enable rainwater to run off into the surrounding soil
If concrete shrinks away from edge of pipe while setting, seal the resultant gap with a bead of mastic

Fig 10. Given the amount of rain we seem to get in this country, it would seem a sensible precaution to slope the top of the base to prevent water "ponding" around the ground post

Given the amount of rain that seems to fall in this country, it is an idea to ensure that the top of the base is slightly higher in the centre so that the rainwater will run off and prevent "ponding" around the ground post (Fig 10). If it is desired to keep the top surface below ground for aesthetic reasons, cast a concrete raising piece around the post (Fig 11) because it is obviously a good idea to have the points at which corrosion can occur clearly visible.

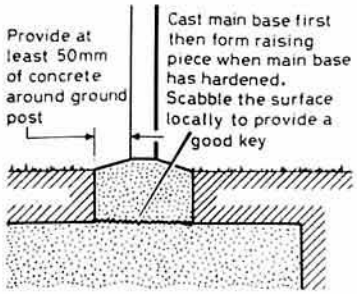
Provide at least 50mm of concrete around ground post
Cast main base first then form raising piece when main base has hardened. Scabble the surface locally to provide a good key

Fig 11. Large bases might be considered unsightly if exposed on the top. The top of the base can be below ground, but it is advisable to cast a raising piece around the ground post; the idea being to ensure that all possible sites of corrosion are above ground where they can be seen before it is too late

TO BE CONCLUDED

WIND LOADING

D J REYNOLDS, G3ZPF*

(PART 2)

Guy rope anchors

For taller masts, guy ropes are often needed with large headloads. The same guidelines apply to the concrete blocks which secure them as to the tower base. Always ensure at least 50mm of concrete around all metalwork below ground, and concrete free from voids. Fig 12 shows an arrangement I have seen suggested, but all that prevents the eyebolt being pulled out is the local bond between the curved surface of the bolt and the surrounding concrete. This is not likely to be very much, especially if the concrete has voids or if (and this is a real no-no) the anchor block was formed first and then the bolt was just pushed into the wet concrete. Adding a plate to the eyebolt (Fig 13) provides a much more secure fixing, or alternatively Fig 14 could be used. The literature I was sent by the various tower makers contained no reference to guy anchors, since few amateurs aspire to monster setups, but, as always, their advice should be sought as to the size of each anchor block.

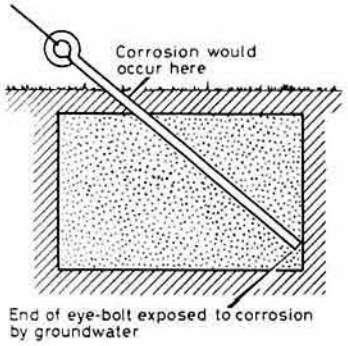

Fig 12. A guy anchor of this general type was seen in the amateur press recently. Apart from the fact of corrosion where the metalwork is in contact with the ground, all that prevents the eye-bolt from being pulled out is local bond between the surface of the bolt and the surrounding concrete

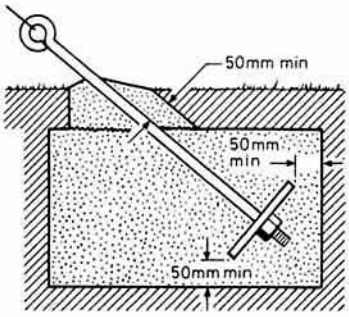

Fig 13. By fixing a plate to the eye-bolt, a far greater pull-out strength is obtained. Always provide a minimum of 50mm of properly compacted concrete around all metalwork below ground

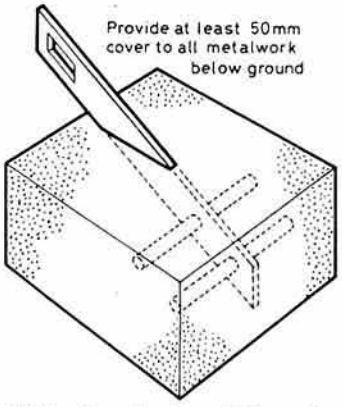

Fig 14. An alternative type of fixing to Fig 13

*502 Lapwood Avenue, Kingswinford, W Midlands DY6 8SG.

Locating the tower

The precise location of a tower within the boundaries of any QTH will be dependent on a number of factors, but one which is often overlooked completely is the location of underground services. Although the loads presented to the ground from amateur tower bases are usually negligible, the blame for any damage to adjacent services could well be laid at the amateur's door even if it was due to entirely "natural" causes. Site plans are often available at local authority offices, especially for recent developments, and the short time it takes to go and look at them can save a good deal of heartache later on. It is not a good idea to discover the location of the electricity service by putting a shovel through it, or the gas feed by putting a pick through it. When I moved into my QTH I found my gas feed while digging a hole to plant a conifer. It was less than 2ft down, and if my neighbour had been at home at the time I would probably have borrowed his pick to break up the ground. Funny how a conifer suddenly looks better somewhere else though!

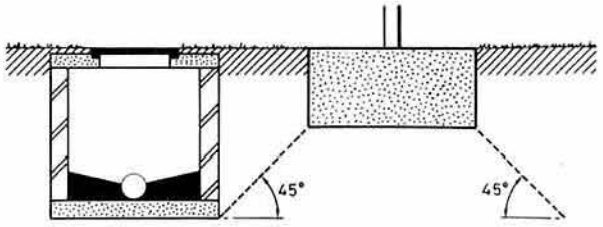

Fig 15. Although the forces involved with amateur tower bases will usually be negligible, it pays to keep well clear of manholes. Most manholes will only be about 900mm deep anyway, but it pays to check

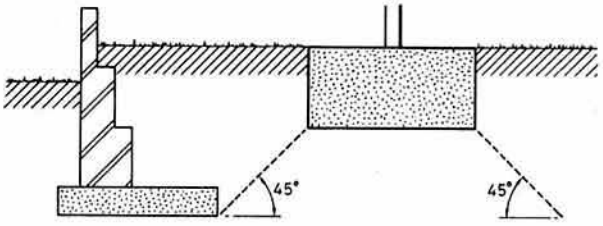

Fig 16. Keep well away from retaining walls, because any problems incurred due to other causes could well be laid at the amateur's door

Most manholes on housing developments will be about 900mm deep, but they might be deeper where the ground is flat for considerable distances. Make sure that the tower base does not surcharge the walls of the manhole (however insignificantly), or the actual drain runs themselves. There will usually be at least one manhole close to the house, for the foul drain, so lifting the lid will show what direction the pipe runs away. Figs 15, 16 and 17 show the desirable distances to keep from manholes, retaining walls and pipe runs. The dotted lines show the boundary of the soil zone surcharged by the base. As I said previously, the loads will be negligible, but in the case of any future problems it helps to be "squeaky" clean. In any case, if workmen ever need to attend to the services, keeping a good distance avoids the embarrassment of them having to dig up your tower too!

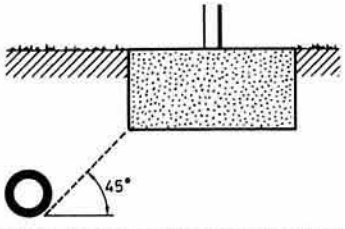

Fig 17. Find out where the various services crossing the property are located and keep well clear of them. Gas and electricity supplies can be quite close to the surface sometimes. It is not pleasant to find them the hard way!

Rotators

These are one of the most abused items of an antenna system. The most important properties of a rotator which must not be exceeded are its torque, and axial load capacity. The torque capacity is the ability to resist any twisting effect caused by the wind on the antenna. Even if the antenna is arranged symmetrically on the top of the mast, the wind may not blow evenly across it. Fig 18 shows the worst case, with the full force of the wind striking exactly half of the antenna, causing an imbalance of half of the antenna's quoted wind load. The torque, or twisting moment is evaluated as half of the wind load multiplied by one quarter of the element length. Note that in vhf long-Yagis the proportions are such that one quarter of the boom length should be used instead.

When studying rotator specifications it is important to find out whether the quoted torque capacity is a working load or an ultimate load. If the figure quoted is the ultimate load, take half as a safe working load. Rotators are expensive. It pays to look after them, and to allow for the possible enlargement of the antenna array in the future. It also pays to put rotators in a cage, especially if an extension tube is to be used. Remember to consult the tower maker before adding extension tubes, as they will reduce the permitted headload of the tower. To see the effect of an extension tube on an uncaged rotator, consider the following hypothetical example.

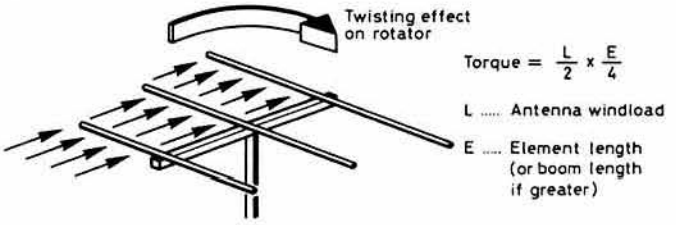

Fig 18. Wind pressure is not always exerted uniformly across the surface of an antenna. As a worst case, for the rotator, the wind force strikes only one half of the antenna. This causes a twisting effect which the rotator must be capable of resisting

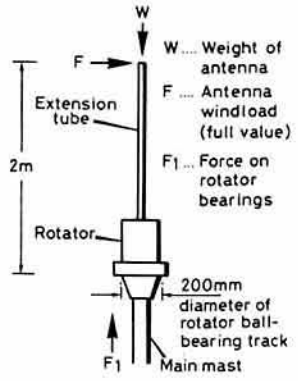

Fig 19. The effect of an extension tube is to magnify the horizontal wind load of the antenna(s) and present it as an axial load on the rotator bearings in addition to the weight of the array

A rotator is available with an ultimate torque of 500kg/cm, and an axial load capacity of 40kg. It is proposed to use this with a 2m extension tube to support a vhf/uhf array with a wind load of 5kg, and a total weight of 1kg. The total torque from the combined array is known to be 200kg/cm, so will the rotator be adequate?

First check the torque capacity. Since the 500kg/cm is an ulitmate load, this has to be halved to give a safe working load of 250kg/cm, which should be adequate as the applied torque is 200kg/cm.

Looking at the axial loading of 3kg, the capacity of the rotator at 40kg would appear to be easily adequate. Indeed, it would be if the rotator were caged, but Fig 19 shows the forces involved in this case. When the wind blows on the antenna it will attempt to twist open the body of the rotator. The rotator tries to prevent being broken apart, and the weakest point is inevitably the ball-bearing ring. In this example, to maintain equilibrium . . .

$$F \times 2000 = F1 \times 200 \text{ (assuming a ring diameter of 200mm)}$$

or in other words

$$F1 = 10 \times F$$

In this example that means a value of 50kg being presented to the rotator bearings, **plus** the 3kg self-weight of the antenna array. This will almost certainly lead to breakdown of the bearings, especially if the axial load capacity quoted was an ultimate value. As with torque, a factor of safety of two is desirable. Fig 20 shows how a rotator cage removes the overturning forces. A simple sleeve bearing (packed with grease) takes most of the strain.

As a final point, in areas where rotators are prone to freezing solid during the winter, why not try lagging the rotator cage with insulation of some kind?

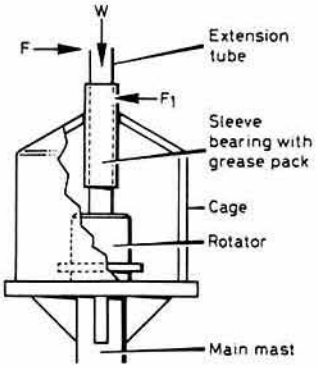

Fig 20. The sleeve bearing takes out the horizontal force, leaving only the vertical weight of the antenna to act on the rotator

Maintenance

However well designed a tower and antenna are, their longevity will be greatly influenced by how well they are protected from the elements. In coastal regions the main problem will probably be from the salt air, whereas around centres of industry, chemical attack will predominate. Even where the air is free from contaminants, rainwater will corrode unprotected steelwork and it is important to make regular checks to ensure that the integrity of the manufacturer's protective coating has not been breached. Aluminium develops a thin "patina" on exposure to the air whereupon further corrosion should be almost totally inhibited, but in aggressive industrial atmospheres this may not be the case. There are a variety of surface sealants available on which the antenna supplier should be able to advise, and which should pay for themselves in terms of the increased life of the antenna.

In commercial applications all towers have to be regularly inspected, especially for insurance purposes. Amateurs would seem to have a much easier time of it at the moment, since the ARIS cover extends to antennas and masts seemingly without any checks being made. I did write to them to clarify this, and although at the time of writing had received no reply it is possible that an inspection would be made in the event of a claim, whereupon "contributory negligence" could well affect your cover. I have no idea where home-made masts would stand in this situation, so it might pay to check.

Even with a well-maintained tower and beam, designed to meet the full rigours anticipated by the appropriate codes of practice, the weather is such a variable item that there can be no absolute guarantee that a tower will not succumb to the wind. There will always be a very slight possibility of something unexpected happening, and given the potential for secondary damage or injury caused by a collapse, it would be unwise not to insure against it.

Acknowledgements

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The basic wind speed map is based on information provided by the Meteorological Office and reproduced with the permission of Her Majesty's Stationary Office.

Bibliography

The following publications also contain information about wind loadings:

BRE DIGEST 119 "The assessment of wind loadings".

BRE DIGEST 283 "The assessment of wind speed over topography".

They can be obtained from HMSO bookshops, and possibly loaned from local libraries. □